

1 METHODS AND APPARATUS FOR BROADCASTING INTERACTIVE
2 ADVERTISING USING REMOTE ADVERTISING TEMPLATES

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7
8 TECHNICAL FIELD

9 The invention relates generally to supplementing
10 broadcast television programming with interactive content,
11 and in particular to interactive advertising.

12
13 BACKGROUND OF THE INVENTION

14 The Internet is a worldwide collection of networks and
15 gateways. The Internet includes a backbone of high-speed
16 data communication lines between major nodes, consisting of
17 thousands of commercial, government, educational, and other
18 computer systems, that route data and messages. The
19 WorldWide Web (the Web) is a collection of formatted
20 hypertext pages located on numerous computer systems around
21 the world that are logically connected by the Internet.
22 The Web has become a valuable information resource.

23 Web browsers, software providing user interfaces to
24 the Web, allow individuals to access Internet content from
25 personal computers. Internet terminals, such as those
26 pioneered by WebTV Networks, Inc., the assignee of the
27 present invention, have made the Web accessible to an even
28 larger segment of the population by providing Web access
29 without a personal computer. Internet terminals (also
30 commonly referred to as set-top boxes) provide Web access

1 using an ordinary television (TV) set as a display and a
2 remote control or wireless keyboard for user input.

3 Figure 1 illustrates a basic configuration of a network
4 100 that includes Internet and broadcast-television
5 components. Network 100 includes a pair of clients 110 and
6 a receiver/client 112. Receiver/client 112 is so named
7 because it operates both as a television receiver and as an
8 Internet client. Hereafter, receiver/client 112 is
9 referred to as receiver 112 for simplicity.

10 Clients 110 and receiver 112 are coupled to a modem
11 pool 120 via direct-dial, bi-directional data connections
12 130, which may be telephone (POTS, i.e., "plain old
13 telephone service"), cable, satellite forward channels,
14 ISDN (Integrated Services Digital Network), or any other
15 similar type of connection. Modem pool 120 is typically
16 coupled to a number of remote servers 140 via a network
17 infrastructure, such as the Internet 160. An additional
18 server 150 specifically supports receiver 112.

19 Clients 110 and receiver 112 communicate bi-
20 directionally with servers 140 and 150 through modem pool
21 120 and the Internet 160. Modem pool 120 is typical of
22 those found today throughout the world providing access to
23 the Internet and private networks. In addition to
24 communicating with servers 140 and 150, receiver 112
25 receives broadcast data and video from a broadcast
26 television network 170 via, e.g., antennas 175. Broadcast
27 television can be delivered using many mediums, including
28 terrestrial (i.e., "over-the-air") broadcast, cable
29 transmission, satellite transmission, or computer networks.

30 Figure 2 illustrates an embodiment of receiver 112.
31 Receiver 112 includes set-top box 200, an ordinary analog
32 television set 210, and a remote control 220. Set-top box

1 200 may be integrated with television set 210. Television
2 set 210 displays video data, including a graphical user
3 interface, conveyed from set-top box 200 by a video link
4 230. Video link 230 is an RF (radio frequency), S-video,
5 composite video, or other video link.

6 Set-top box 200 includes hardware and software for
7 receiving and decoding a broadcast video signal 240, such
8 as an NTSC, PAL, SECAM, or other TV system video signal,
9 and for providing video data to the television set via
10 video link 230. Set-top box 200 also includes hardware
11 and/or software for providing a user with a graphical user
12 interface 250 capable of displaying Web pages (e.g., HTML
13 or XML pages) and broadcast video. User interface 250 can
14 notify the user of the presence of encoded data embedded in
15 the video signal. The notification may be audible, visual,
16 or a combination of the two. For example, user interface
17 250 might temporarily display an icon in a portion of the
18 screen.

19 Set-top box 200 may include both a standard modem and
20 an ISDN modem, such that the communication link between
21 set-top box 200 and server 150 (Figure 1) can be either a
22 telephone (POTS) connection 260 or an ISDN connection 270.
23 Set-top box 200 receives power through a power line 280.

24 A user operates remote control 220 to control set-top
25 box 200 in browsing the Web, sending e-mail, and performing
26 other Internet-related functions. Set-top box 200 receives
27 commands from remote control 220 via an infrared (IR)
28 communication link 290. A keyboard (not shown) may also be
29 included.

30

EXEMPLARY RECEIVER SYSTEM ARCHITECTURE

Figure 3 is a block diagram illustrating internal features of set-top box 200. A processing unit, such as central processing unit (CPU) 300, and an Application-Specific Integrated Circuit (ASIC) 310 control set-top box 200. ASIC 310 contains circuitry that implements certain features provided by set-top box 200. ASIC 310 is coupled to an audio digital-to-analog converter (DAC) 320 that provides audio output to television 210. ASIC 310 connects to a video encoder 330 that provides video output to television 210. An IR interface 335 detects IR signals transmitted by remote control 220 and, in response, provides corresponding electrical signals to ASIC 310. A standard telephone modem 340 and/or an ISDN modem 342 coupled to ASIC 310 provide connections 260 and 270, respectively, to the Internet.

A television interface (TV I/F) 345 conveys broadcast video signals to ASIC 310. ASIC 310 in turn presents video data carried in broadcast video signal 240 to a viewer of TV 210. TV interface 345 also extracts other data that may be embedded in the video signal. The data so extracted, or a portion thereof, may be displayed concurrently with a television program. For example, analog broadcast signals typically include a portion known as the vertical blanking interval (VBI) that includes a data-service channel for transmitting, among other things, closed-captioning information. TV interface 345 extracts data inserted into the VBI for display on TV 210.

Set-top box 200 also includes read-only Memory (ROM) 350, random-access memory 355, and a mass storage device 360. ROM 350 stores program code for application software executed by CPU 300. RAM 355 serves as temporary storage

1 for CPU 300 as CPU 300 executes instructions. Mass storage
2 device 360 may be used to input software or data to set-top
3 box 200 or to store information received either from
4 network connections or from broadcast signals. Mass
5 storage device 360 includes any suitable data storage
6 medium, such as magnetic tapes, magnetic disks, and optical
7 disks.

8 A number of companies support appliances similar to
9 receiver 112 to enhance broadcast television with Internet
10 content. Unfortunately, the bandwidth of the VBI is
11 limited, so content-rich Web pages or other interactive
12 resources can be slow to broadcast. Consequently, content
13 updates can be undesirably slow. This speed limitation is
14 particularly important to advertisers, who must provide the
15 user an interactive experience in the time span of a
16 fifteen- or thirty-second commercial.

17 As discussed above, some receivers include telephone
18 connections that may be used in place of or as a supplement
19 to the VBI. Such connections do not solve the
20 advertisement bandwidth problems entirely, however, because
21 not all users have access to or are willing to maintain a
22 dial-up connection. Further, establishing a dial-up
23 connection generally takes too long to be practical during
24 a commercial. Thus, the VBI bandwidth limitation is a
25 barrier to effective interactive advertising.

26

27 SUMMARY OF THE INVENTION

28 The present invention addresses the bandwidth barrier
29 to effective interactive advertising. In one embodiment,
30 one or more advertisement templates are stored on a number
31 of remote receivers. The templates include formatting
32 information and fields into which can be inserted

1 predefined types of information. For example, a selected
2 template may be adapted to receive and display an
3 advertiser's name, product, and a hyperlink to the
4 advertiser's web site. A local identifier assigned to each
5 template uniquely identifies the template on every
6 receiver.

7 In accordance with the invention, broadcasters create
8 advertisement summaries that include information for
9 display by a selected template. The advertisement summary
10 includes a resource identifier identical to that of the
11 selected template and specific information for insertion
12 into various fields of the selected template. Broadcasters
13 then broadcast the advertisement summary, typically in a
14 data service channel of a broadcast video signal.
15 Receivers in which the selected template is stored combine
16 the information presented in the advertisement summary with
17 the formatting information of the template to produce and
18 display a custom advertisement. The advertisement summary
19 typically contains far less information than the resulting
20 custom advertisement. Custom advertisements can therefore
21 be presented to viewers in a timely fashion without an
22 Internet connection.

23 In one embodiment of the invention, the data service
24 channel is a captioning service channel. Captioning
25 service channels have low bandwidths. Broadcasting
26 advertisement summaries in a captioning service channel is
27 nevertheless desirable because captioning service channels
28 generally offer very reliable communication. Some
29 embodiments further enhance reliability using a checksum
30 inserted into the advertisement summary.

31 The invention is embodied in machine-readable mediums
32 having stored thereon data representing sequences of

1 instructions. These instructions, when executed by a
2 processor, cause the processor to embed advertisement
3 summaries in a data service channel of a signal. Other
4 instruction sequences executed on remote receivers combine
5 the advertisement summaries with local advertisement
6 templates and display the resulting custom advertisements.
7 The custom advertisements can include dynamic Internet
8 content to provide viewers with interactive advertising
9 experiences.

10 Other features of the present invention will be
11 apparent from the accompanying drawings and from the
12 detailed description that follows.

13

14 BRIEF DESCRIPTION OF THE DRAWINGS

15 Figure 1 (prior art) illustrates a basic configuration
16 of an Internet system network 100.

17 Figure 2 (prior art) illustrates an embodiment of a
18 receiver/client 112 for displaying broadcast television and
19 Internet content.

20 Figure 3 (prior art) is a block diagram illustrating
21 internal features of a set-top box 200.

22 Figure 4 illustrates a communication system 400 in
23 which a broadcaster 405 communicates with a conventional
24 television set 410 via a broadcast video signal 415 and a
25 bi-directional network connection through the Internet 420.

26 Figure 5 is a flowchart 500 depicting a method
27 employed by a content creator to broadcast advertisement
28 summaries to advertisement templates stored locally on a
29 number of remote receivers.

30 Figure 6 is a flowchart 600 depicting a method
31 performed by a receiver configured in accordance with the
32 invention to respond to advertisement summaries.

1

2 DETAILED DESCRIPTION OF THE INVENTION

3 Figure 4 illustrates a communication system 400 in
4 which a broadcaster 405 communicates with a television set
5 410 via a broadcast video signal 415 and with a receiver
6 417 via broadcast video signal 415 and a bi-directional
7 network connection 416 through the Internet 420. Internet
8 420 is understood to include all required modems, lines,
9 and other components.

10 Receiver 417 includes a second television set 435
11 connected via a video line 440 to a set-top box 445 similar
12 to set-top box 200 of Figures 2 and 3. Television set 435
13 and set-top box 445 work together to display Web pages,
14 broadcast television, or both. Web pages are typically
15 downloaded over the Internet 420, but may also be received
16 from a broadcast television signal or retrieved from a
17 local memory source, such as a disk drive 450 in set-top
18 box 445. Set-top box 445 stores Web pages locally in each
19 case.

20 Receiver 417 and television set 410 each show, for
21 illustrative purposes, a broadcast television commercial
22 sponsored by a cruise line. In accordance with the
23 invention, a portion of television set 435 in receiver 417
24 additionally displays an interactive custom advertisement
25 460 related to the commercial.

26 A displayed television program need not be related to
27 a simultaneously displayed advertisement. For example,
28 television 435 can simultaneously display a sports program
29 and a clothing advertisement. Furthermore, the invention
30 is not limited to advertisements. Custom advertisement 460
31 can be substituted for a field displaying sports scores,

1 local weather, or television channel information, to name
2 just a few possibilities.

3 The bandwidth of the data-service channels of
4 broadcast video signal 415 is limited. Moreover, some of
5 that bandwidth may be used to provide closed captioning and
6 other data services. The available bandwidth may therefore
7 be too limited to transmit the data required to render
8 custom advertisement 460 in a timely fashion, for example
9 during the first few seconds of a 15- or 30-second
10 commercial. The present invention overcomes this bandwidth
11 limitation, enabling content providers to quickly present
12 viewers with interactive custom advertisements or other
13 interactive content.

14 Disk drive 450, or some other storage medium, includes
15 an advertisement template 465, which in turn includes
16 generic interactive content. For example, advertisement
17 465 includes a title field 470, a description field 475, a
18 URI field 480, and a form-entry field 483. As discussed
19 below, these fields are adapted to accept custom
20 advertising information that allows a sponsor to solicit
21 email addresses from interested viewers. Other embodiments
22 include additional advertisement templates -- each with a
23 unique resource identifier -- that offer different
24 configurations for sponsors' ads. Different templates may
25 offer different font options, different numbers and sizes
26 of text boxes, and different color and transparency
27 options, for example.

28 Broadcaster 405 can broadcast an advertisement summary
29 as a trigger directed to advertisement template 465. In
30 the example, the advertisement summary communicates a
31 sponsor's name and solicits a viewer's email address. Set-
32 top box 445 combines template 465 with the advertisement

1 summary and displays the result as custom advertisement
 2 460. Custom advertisement 460 includes a form field 490
 3 into which a viewer can enter his or her email address to
 4 request additional information about the advertised cruise.
 5 The viewer can then submit the email address by selecting a
 6 "submit" button 493 using, e.g., a mouse or remote control.
 7 The sponsor, "Ship Trips" in the example, could then send
 8 the viewer additional information from a server 495 that
 9 Ship Trips maintains.

10 The following text is exemplary HTML code for
 11 advertisement template 465.

```

12
13     <HTML>
14     <HEAD>
15     <SCRIPT LANGUAGE="JavaScript">
16     function setup(title, description, field, uri)
17     {
18         document.write(
19             "<B>" + title + "</B><BR>"
20             + "<FORM action=" + uri + ">"
21             + description
22             + "<INPUT TYPE=text NAME=" + field + ">"
23             + "<INPUT TYPE=submit></FORM>"
24         )
25     }
26     </SCRIPT>
27     </HEAD>
28     <BODY BGCOLOR="#ff0000">
29     <!-- Embed TV here -->
30     <IMG SRC="tv:" height=300 width=400>
31     <BR>
32     </BODY>
  
```

1 </HTML>

2

3 Advertising template 465 can be loaded into set-top box 440
4 via an Internet connection, the VBI, or by any other
5 conventional means. Once set-top box 440 has advertisement
6 template 465 in local memory, broadcaster 405 can broadcast
7 an advertisement summary directed to template 465.

8 Receiver 417 can then combine the information in the
9 advertisement summary with that of template 465 to create
10 and display a custom advertisement (e.g., custom
11 advertisement 460).

12 Advertisement template 465 is relatively simple:
13 other, more complex, templates can easily be imagined.
14 Such templates can be sufficiently complex that the data
15 used to represent custom advertisements is too great to
16 transmit during a broadcast television commercial or other
17 time-limited program. That is, the data required to
18 represent the custom advertisement is greater than the
19 product of the available bandwidth and the duration of the
20 program. Furthermore, viewers may not have sufficient time
21 to interact with displayed content even where custom
22 advertisements can be transmitted within the timeframe of a
23 program. In either case, broadcasting summaries to be
24 combined with local templates increases the time during
25 which viewers may interact with a custom advertisement, and
26 consequently increases the probability that viewers will
27 interact with an advertisement.

28 Over time, particular advertisement templates may
29 become obsolete. Some templates therefore include a time
30 stamp that stores the date that the template was last used.
31 Templates that have not been used for a specified time can
32 then be deleted to save space in local memory.

ADVERTISEMENT SUMMARIES

Advertisement summaries are trigger messages, or "triggers," broadcast to receivers of broadcast video. Such triggers generally instruct receivers to take a specific action to synchronize the content of a Web page with a broadcast television program. For purposes of the present invention, advertisement summaries are triggers that (1) are addressed to templates stored in remote receivers, and (2) include custom advertisement information to be combined with templates to create a custom advertisement.

Advertisement summaries include a resource identifier and one or more attribute/value pairs. The resource identifier addresses a particular template, while the attributes identify fields within the template into which the values are inserted. Advertisement summaries may be transmitted in the VBI of a broadcast video signal. The text service channels of line 21 of the VBI provide a robust communication medium, albeit at relatively low bandwidth. In some embodiments of the invention, advertisement summaries are text based, and their syntax follows a basic format that complies with the Electronic Industries Association EIA-746A, "Transport of Internet Uniform Resource Locator (URL) Information Using Text-2 (T-2) Service" (September 1998). EIA-746A defines the formatting necessary to transmit Internet URLs using the vertical-blanking interval of a broadcast television signal, and is incorporated herein by reference. URLs are a conventional type of universal resource identifier, or "URI," which is a character string used to identify a resource, such as a file. Other types of URIs include

1 local identifiers (LIDs), and universal resource names
2 (URNs).

3 In one embodiment that complies with EIA-746A, each
4 advertisement summary includes a URI, or universal resource
5 identifier, followed by zero or more attribute/value pairs
6 and an optional checksum, as follows:

7
8 `<uri> [attr1:val1] [attr2:val2] ... [attrn:valn] [checksum]`
9

10 The URI is enclosed in angle brackets. For example, the
11 URI "lid://www.webtv.net/template/info" might identify
12 template 465.

13 The following is an exemplary advertising summary for
14 combining with the foregoing HTML template to create custom
15 advertisement 460 of Figure 4:

16
17 `<lid://www.webtv.net/template/info> [name:More about`
18 `Ship Trips] [script:setup("SHIP TRIPS", "your email:",`
19 `"email", "http://shiptrips.com/emailinfo")]` [12ab]
20

21 The "lid" field includes a URI that identifies the target
22 advertisement template. The sponsor parameter "SHIP TRIPS"
23 passed with the script attribute allows a sponsor to fill
24 in title field 470 with the sponsor's identity. Similarly,
25 description and URI parameters allow the sponsor to fill in
26 respective description and URI fields 475 and 480. The
27 sponsor and description parameters provide viewers with
28 readable text 485, while the URI parameter provides viewers
29 with a hyperlink 490 to additional information of interest.
30 For example, a viewer might select hyperlink 490 to
31 establish an Internet connection to server 495 to obtain
32 additional information about the advertised cruise.

1 The attributes discussed above are exemplary. Other
2 useful attributes include color, font style, font size,
3 transparency, texture, advertisement size, and
4 advertisement position. The templates might also include a
5 number of predefined logos that could be selected using a
6 "logo" attribute that accepts a value corresponding to a
7 desired logo. For example, the Microsoft Windows™ logo
8 might be displayed when the logo attribute is provided with
9 an ASCII number 5.

10 The duration of a typical television commercial limits
11 the amount of time that a custom advertisement should be
12 displayed. Referring to the example of Figure 4, for
13 example, custom advertisement 460 should not carry over
14 into a subsequent commercial. Thus, some embodiments
15 include a "time-out" attribute that allows the author of an
16 advertisement summary to determine the longevity of a given
17 custom advertisement. Alternatively, custom advertisements
18 could be removed using a trigger. Advertisers may provide
19 such a trigger at the beginning of a commercial to ensure
20 that templates associated with previous commercials are
21 removed.

22 Conventional interactive television typically prompts
23 the viewer to determine whether the viewer is interested in
24 interactive content before presenting the interactive
25 content. Sponsors may wish to provide the interactive
26 custom advertisement to viewers without first seeking
27 permission to do so. Thus, one embodiment includes and
28 "auto" attribute that allows a content creator to specify
29 whether a custom advertisement should be automatically
30 presented to the viewer or should be presented only if the
31 viewer seeks additional information.

1 A checksum may be appended to the end of the logical
2 address link to detect data corruption that may occur
3 during receipt or transmission of a trigger. A two-byte
4 hexadecimal checksum is employed such as a checksum that
5 would be produced by the standard TCP/IP checksum algorithm
6 described in Request For Comments (RFC) 719, "Internet
7 Protocol," September 1981, which is incorporated herein by
8 reference. According to one embodiment, the checksum is
9 computed by pairing adjacent characters in the string
10 (starting with the first delimiter) to form 16-bit
11 integers. If there is an odd number of characters, the
12 final character is paired with a byte value of zero. The
13 checksum is computed such that the one's complement sum of
14 all of the 16-bit integers plus the checksum equals the 16-
15 bit integer with all 1 bits.

16 17 BROADCAST METHOD

18 Figure 5 is a flowchart 500 depicting a method
19 employed by a content creator (e.g., a program producer,
20 broadcaster, affiliate, cable company or satellite
21 provider) to broadcast advertisement summaries to
22 advertisement templates stored locally on a number of
23 remote receivers.

24 The content creator, typically an employee of the
25 sponsor, first creates an advertisement summary (step 510)
26 using, for example, the syntax described above. The
27 content creator then embeds the advertisement summary into
28 a data service channel of a video signal to be broadcast
29 (step 520). The video signal might represent a television
30 commercial stored on videotape, for example. The sponsor
31 then delivers the commercial to a broadcaster. Finally,

1 the broadcaster broadcasts the commercial, including the
2 advertisement summary (step 530).

3 In one embodiment, the broadcast video signal is a
4 National Television Standards Committee (NTSC) video signal
5 including a vertical blanking interval (VBI), and the data
6 service channel is selected from a captioning service
7 channel of a text service channel. The video signal may
8 also be Phase Alternate Lines (PAL), Sequential Couleur
9 Avec Memoire (SECAM), High Definition Television (HDTV), or
10 a digital video signal such as a Digital Video Broadcasting
11 (DVB) signal or an Advanced Television Systems Committee
12 (ATSC) signal. Where the broadcast video signal is NTSC
13 video signal, the advertisement summary can be imbedded
14 into line 21 of the vertical blanking interval (VBI). The
15 protocols for broadcasting data in line 21 of the VBI call
16 for relatively robust, low-speed communication. Higher
17 bandwidth can be obtained using other lines of the VBI.

18 Advertisement summaries need not be provided with a
19 commercial. Where desired, a content creator may embed one
20 or more advertisement summaries into a captioning or text
21 service packet of a video signal. This process may be
22 repeated during video signal processing at each point along
23 the video-signal distribution path.

24 The foregoing broadcast methods are embodied in
25 machine-executable instructions, which can be used to cause
26 a general-purpose or special-purpose processor programmed
27 with the instructions to perform the steps. Alternatively,
28 the steps might be performed by specific hardware
29 components that contain hardwired logic for performing the
30 steps, or by any combination of programmed computer
31 components and dedicated hardware.

32

RECEIVER METHOD

Figure 6 is a flowchart 600 depicting a method performed by a receiver configured in accordance with the invention to respond to advertisement summaries. First, the receiver stores an advertisement template in local memory (step 605). The receiver can obtain the resource from any number of information sources, such as from a server on the Internet, from a broadcast signal, or from a local memory device, such as a hard-disk drive or CD-ROM drive.

In one embodiment, the templates are Web pages (e.g., HTML or XML pages). The templates include a unique local resource identifier and formatting information. The templates may also include a script capable of receiving data from an advertisement summary and incorporating that data into the template. Alternatively, a script for incorporating data into the template may be included in the advertisement summary. In either case, the script might be written in a scripting language, such as JavaScript™, ECMAScript, JScript™, or VBScript. Such scripts allow content creators to dynamically alter the HTML content of the template.

Next, in step 610, the receiver monitors one or more broadcast channels for valid advertisement summaries directed to the stored advertisement template. For example, where the advertisement template is identified by an LID, the receiver monitors broadcast video for advertisement summaries that include an LID matching that of the advertisement template. A valid advertisement template is one that is encoded in a predetermined syntax, such as the syntax described above, and whose resource identifier and attribute/value pairs are not corrupted.

1 The above-described checksum is used to determine whether
2 the resource identifier and attribute/value pairs are
3 corrupted. The receiver ignores invalid advertisement
4 summaries.

5 Upon receipt of a valid advertisement summary matching
6 the advertisement template (step 620), the receiver
7 determines whether the resource identifier associated with
8 the advertisement summary matches that of an advertisement
9 template stored in local memory (decision 630). If not,
10 the receiver disregards the advertisement summary (step
11 640) and continues monitoring the broadcast channel. In
12 another embodiment, templates not found on the receiver can
13 be retrieved from a remote server. Such an embodiment is
14 particularly useful for receivers that have little local
15 storage and/or high-bandwidth, on-demand Internet access.

16 If in step 630 the resource identifier matches that of
17 an advertisement template stored in the receiver, then the
18 receiver combines the information presented in the
19 advertisement summary with the formatting information
20 provided by the matching advertisement template (step 650).
21 Combining the advertisement summary and advertisement
22 template creates a custom advertisement. The receiver
23 displays the custom advertisement (step 660) and continues
24 monitoring the broadcast channel (step 610).

25 Some embodiments require an identical match in step
26 630. Others select a best match. In one embodiment, for
27 example, receivers might include advertisement templates
28 dedicated to particular sponsors. Any advertisement
29 summary generated by that sponsor would then call up that
30 template. For example, any advertisement summary in which
31 the sponsor name included the term "Microsoft" might cause
32 a receiver to display a dedicated Microsoft template.

1 The foregoing receiver methods are embodied in
2 machine-executable instructions, which can be used to cause
3 a general-purpose or special-purpose processor programmed
4 with the instructions to perform the steps. Alternatively,
5 the steps might be performed by specific hardware
6 components that contain hardwired logic for performing the
7 steps, or by any combination of programmed computer
8 components and dedicated hardware.

9 While the present invention has been described in
10 connection with specific embodiments, variations of these
11 embodiments will be apparent. Therefore, the spirit and
12 scope of the appended claims should not be limited to the
13 foregoing description.

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